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February 4, 2020

Catherine Jerrard
Program Manager/BEC
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706 Hangar Road
Rome, New York 13441

RE: Review of the Draft Soil Vapor Extraction System and EBR Pilot Study 2018 First and Second Quarter Performance Report, Former Liquid Fuels Storage Area Site ST012, Former Williams Air Force Base, Mesa, Arizona, December 2019

Dear Ms. Jerrard:

EPA has reviewed the Draft 2018 Annual Performance Report for the Soil Vapor Extraction(SVE) system and Enhanced Bioremediation (EBR) pilot study activities. We offer the following comments on the report:

GENERAL COMMENTS

1. Most of the tables in Section 3 of the Draft Soil Vapor Extraction System and EBR Pilot Study 2018 First and Second Quarter Performance Report, Former Liquid Fuels Storage Area Site ST012, Former Williams Air Force Base, Mesa, Arizona, dated December 2019 (the Draft Report) are not numbered, and the table on pdf page 50 is neither numbered nor titled, making it difficult to identify where the tables that are referenced in the report are without referring to the Table of Contents. Please revise the tables to include a title and table number.
2. The Draft Report discusses several soil vapor extraction (SVE) wells and temperature monitoring points (TMPs) at ST012 that are listed in Table 2-1, ST012 SVE System Well Summary, but these wells are not located on any figure, with the exception of SVE04D. Please revise the figures to include all the wells listed in Table 2-1.
3. Appendix D, SVE Data Validation Narratives, includes data qualifiers for samples but the qualifiers were not carried forward into data summary tables. For example, the sample ST012-SVE04S-031318 result was reported as 0.0051 F on pdf page 182 of Appendix D but is noted as 0.0051 J in Table 2-8, Fixed Laboratory Analytical Results. Similarly, the benzene result in ST012-SVE02S is 6.2 F micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) in Appendix D (PDF Page 177) but is reported as 0.0019 J in Table 2-8, Fixed Laboratory Analytical Results. Additionally, Table 2-8 presents results for ST012-SVE03S (Dup)

that do not include qualifiers, but the data presented in Appendix D (PDF Pages 207-208) notes that all the duplicate results were “J” qualified. Please ensure the qualifiers in Appendix D are carried over for all results presented in the Draft Report.

SPECIFIC COMMENTS

- 1. Table 2-6, Summary of SVE VOC Measurements, Page 2-10 through 2-12:** The Table 2-6 Notes do not define all acronyms used in the table. For example, the table includes “NM” and “NA” but these are not defined in the Notes section. Please revise Table 2-6 to define all acronyms used in Table 2-6.
- 2. Section 2.2.1.1, SVE Vapor Sample Analysis, Page 2-13 and Table 2-7, Summary of SVE Gas Measurements, Page 2-13:** Section 2.2.1.1 states that, “Collectively, O₂ [oxygen], CH₄ [methane], and CO₂ [carbon dioxide] data indicate that microbial activity, including VOC [volatile organic carbon] biodegradation, is occurring in the SVE treatment zone;” however, the text does not discuss how the data presented in Table 2-7 indicate that microbial processes are occurring. Rather, the text provides an overview of the gas measurements and does not explain how each gas relates to microbial activity. Please revise the text to discuss how the data obtained relate to microbial activity.
- 3. Section 2.2.1.2, SVE Process Monitoring, Page 2-15 and Appendix B, SVE Field Monitoring Results, Page 14 to Page 15:** The Appendix B tables provide averages in red text on Page 15, but the averages listed do not coincide with the averages discussed in Section 2.2.1.2. For example, the average wellfield temperature for fourth quarter 2017 is 115.2 degrees Fahrenheit (°F) in Appendix B (Page 15) but was noted to be 104.6°F in Section 2.2.1.2. Please ensure the average wellfield temperatures are reported consistently throughout the Draft Report.
- 4. Section 2.2.1.2, SVE Process Monitoring, Page 2-15 to Page 2-17, and Appendix B, SVE Field Monitoring Results:** Section 2.2.1.2 lists several temperature ranges, flow rates, and other data but it is unclear where this information can be found in Appendix B. For example, the text states that the exit controller temperature ranged from 1,170 to 1,213°F for treatment in thermal mode, but these numbers could not be identified in Appendix B. Please identify where the data presented in the text can be found.
- 5. Section 2.3.2, Notable Trends, Page 2-26 and Appendix E, SVE Historical Hydrocarbon Concentration Data:** Section 2.3.2 states that the range of VOCs were elevated in five well locations, noting a range of 8,000 parts per million by volume (ppmv) to 30,000 ppmv but several of the figures indicate that the starting concentrations were much higher in some instances depending on the analysis considered. For example, Figure E-3, SVE01 Middle, indicates that the initial flame ionization detector (FID) reading was approximately 230,000 ppmv total petroleum hydrocarbons (TPH), but the laboratory analytical data result was approximately 30,000 ppmv TPH. The text should be revised to clarify whether the data discussed is specific to FID data, photoionization detector (PID) data, or laboratory analytical data. Please revise Section 2.3.2 to clarify

the types of data being discussed and ensure the data reported is consistent with the figures.

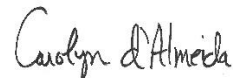
6. **Section 2.3.2, Notable Trends, Page 2-28:** The text should discuss trends in more detail. While the text briefly discusses oxygen and methane trends, a discussion of carbon dioxide and carbon monoxide data is missing. Additionally, the text should discuss other factors, such as the range of temperature that is optimal for biological activity. Please revise the text to include a discussion of carbon dioxide and carbon monoxide data. Additionally, please provide additional information regarding the optimal temperature range for microbial activity and the temperature range found in the dataset.
7. **Section 3.1.5, Groundwater Extraction and Treatment Activities, Page 3-7:** Section 3.1.5, line 1035, states that, “Results of the process samples are provided in Table 3-5;” however, results of process samples are provided in Table 3-3, per the Table of Contents. Additionally, Table 3-3 is not numbered in the Draft Report. Please revise Section 3.1.5 text to reference the correct table and ensure that Table 3-3 is numbered in the Draft Report.
8. **Table 3-3, Process Water Sample Analytical Results by Sample Date and Location for the Reporting Period, Page 3-8 to Page 3-10 and Appendix N, Process Wastewater Laboratory Report:** Table 3-3 does not include all of the information presented in Appendix N. For example, summarized information for sample ST012-LGAC EFF C101 SP-253-050218 is missing from Table 3-3. Please revise Table 3-3 to summarize information provided in Appendix N.
9. **Section 3.3.1, Contaminant and Terminal Electron Acceptor Distribution, Page 3-23:** Section 3.3.1 mentions the results presented on Figures 3-4 through 3-15 and provides a brief overview of the data but does not discuss how the inferred areas (dashed contour lines) will be addressed. Additionally, the text states that low nitrate and sulfate coupled with higher iron concentrations in areas with higher benzene are related to biological activity but does not discuss why this is the case. Please revise Section 3.3.1 to provide additional information regarding the data gaps associated with nitrate, iron and sulfate results and discuss how the trends indicate that biological activity is occurring.
10. **Appendix B, SVE Field Monitoring Results, Pages 4, 12, 14, 26, 71, and 79:** The SVE Systems Monitoring Record tables should include additional detail. For example, one of the tables has several highlighted entries on 11/11/2016 (Page 4), 11/10/2016 (Page 12), and 9/21/2017 (Page 14) but the highlights are not discussed. Additionally, some table entries are “#VALUE!” or not available (NA) but this is not discussed in the notes or the text. For example, SVE-11 on 06/10/2016 (Page 71) and SVE-14 on 05/20/2016 (Page 79) both include “#VALUE!” and/or NA data placeholders. Please revise the tables to be complete by adding a note to discuss why some entries are highlighted and ensure any missing values are provided or explained.

11. Appendix B, SVE Field Monitoring Results, Page 12: The column titled, “Details Regarding Other Condensate Activities Performed” notes that personnel “Started the Calculations for the On-Site storage tank;” however, these calculations are not discussed. Please revise the table to add a note clarifying the calculations used and where the results can be found.

12. Appendix M, Pilot Study Field Log Data and Extraction Volume Estimates, Microbial Insights Report, Page 5: There are several table entries that are highlighted in Appendix M. For example, the Wellhead Field Logsheet for ST012-CZ07 has an entry highlighted for 6/22/2018 “Totalizer Value (gallons),” but the notes do not discuss what the highlight signifies. Please revise Appendix M to provide notes discussing what the highlighted table entries signify.

Once, again, thank you for the opportunity to review this report. You may reach me at (415) 972-3150 if you wish to discuss.

Sincerely,

A handwritten signature in cursive script that reads "Carolyn d'Almeida".

Carolyn d'Almeida

cc: Wayne Miller, ADEQ
Ardis Dickey AFCEC/CIBW